

CLAIMS

What is claimed is:

1. A gas supplying apparatus for supplying deposition gas onto a substrate surface, the gas supplying apparatus comprising:
a gas supplying ring with one or more gas supplying channels formed along the interior of the gas supplying ring and with a plurality of gas distribution channels directed toward a center of the gas supplying ring; and
a plurality of adapters with gas nozzles connecting to the gas distribution channels, respectively, that detachably connect to the interior of the gas supplying ring, wherein the gas nozzles have a variety of injection configurations.
2. The gas supplying apparatus according to claim 1, wherein the injection configuration of the gas nozzles is changed by changing at least one of an injection angle and an injection position.
3. The gas supplying apparatus according to claim 2, wherein each adapter comprises a gas connecting channel connecting to respective gas distribution channels, wherein the gas supplying ring has a plurality of the gas supplying channels, and the adapters are formed vertically to connect to the gas connecting channel.
4. The gas supplying apparatus according to claim 3, further comprising a blocking device selectively blocking the gas distribution channels.
5. The gas supplying apparatus according to claim 4, wherein the blocking device comprises a plurality of blocking members that are selectively inserted into the plurality of gas distribution channels, respectively, to block the plurality of gas distribution channels.
6. The gas supplying apparatus according to claim 5, wherein the gas supplying ring comprises a plurality of adapter accommodating parts to accommodate the adapters, respectively.

7. The gas supplying apparatus according to claim 6, further comprising a plurality of blocking member accommodating parts formed at outlets of the gas distribution channels that respectively accommodate the blocking members.

8. The gas supplying apparatus according to claim 7, further comprising a plurality of supplementary gas nozzles detachably connected to the adapters, respectively, to connect to the gas nozzles.

9. The gas supplying apparatus according to claim 8, wherein each of the adapters comprises a supplementary gas nozzle holder connecting to the gas nozzles, respectively, to hold the supplementary gas nozzles, respectively.

10. The gas supplying apparatus according to claim 9, wherein the supplementary gas nozzles are positioned at predetermined angles with respect to a gas injection direction of the gas nozzles.

11. The gas supplying apparatus according to claim 3, wherein the gas nozzles extend horizontally into the gas connecting channel toward a center of the gas connecting channel.

12. The gas supplying apparatus according to claim 4, wherein the gas nozzles extend horizontally into the gas connecting channel toward a center of the gas connecting channel.

13. The gas supplying apparatus according to claim 8, wherein the supplementary gas nozzles extend horizontally into the gas connecting channel toward a center of the gas connecting channel.

14. The gas supplying apparatus according to claim 3, wherein the gas nozzles slope downward from the gas connecting channel.

15. The gas supplying apparatus according to claim 3, wherein the gas nozzles slope upward from the gas connecting channel.

16. The gas supplying apparatus according to claim 4, wherein the gas nozzles slope downward from the gas connecting channel.

17. The gas supplying apparatus according to claim 4, wherein the gas nozzles slope upward from the gas connecting channel.

18. The gas supplying apparatus according to claim 1, wherein the gas supplying ring comprises an upper part and a lower part, the upper part and the lower part being combined to form the one or more gas supplying channels.

19. The gas supplying apparatus according to claim 3, wherein the gas supplying channels respectively supply different gases.

20. The gas supplying apparatus according to claim 19, wherein the gas supplying channels comprise a first gas supplying channel and a second gas supplying channel, and the gas distribution channels comprise a first gas distribution channel and a second gas distribution channel, wherein the first gas distribution channel connects to the first gas supplying channel to supply a first gas from the first gas supplying channel, and the second gas distribution channel connects to the second gas supplying channel to supply a second gas from the second gas supplying channel.

21. The gas supplying apparatus according to claim 6, wherein each adapter accommodating part is a cavity in the interior of the gas supplying ring that corresponds to a shape of each respective adapter.

22. The gas supplying apparatus according to claim 4, wherein the blocking device is a valve to selectively block the gas distribution channels.

23. The gas supplying apparatus according to claim 5, wherein the blocking members have cylindrical shapes.

24. The gas supplying apparatus according to claim 23, wherein the blocking device comprises O-rings placed around the respective blocking members to prevent the escape of gas.

25. The gas supplying apparatus according to claim 20, wherein the gas connecting channel is a cavity in each adapter that is adjacent to an outlet of the first gas distribution channel and to an outlet of the second gas distribution channel to connect the first gas distribution channel and the second gas distribution channel to the gas nozzle of the adapter.

26. The gas supplying apparatus according to claim 3, wherein the gas nozzles extend horizontally toward the gas connecting channel, the gas nozzles being positioned in an upper part of the adapter or in a lower part of the adapter.

27. The gas supplying apparatus according to claim 3, wherein the gas nozzles slope toward the gas connecting channel and are positioned in an upper part of the adapter or in a lower part of the adapter.

28. A gas supplying apparatus for supplying gas onto a substrate, comprising:
a gas supplying ring comprising,
a gas supplying channel formed in an interior of the gas supplying ring, and
a plurality of gas distribution channels connecting to the gas supplying channel and extending toward a center of the gas supplying ring;
a plurality of adapters with gas nozzles respectively connecting to the gas distribution channels, the adapters detachably connecting to the interior of the gas supplying ring; and
a plurality of supplemental gas nozzles detachably connecting to the gas nozzles of the adapters, respectively, at various injection angles.

29. A method of supplying gas to a substrate using a gas supplying apparatus, the gas supplying apparatus having a gas supplying ring with a first gas distribution channel and a second gas distribution channel, detachable adapters with gas nozzles having various injection positions and injection angles with respect to the adapters, the gas nozzles connecting to the first gas distribution channel and the second gas distribution channel, the method comprising:
blocking one of the first gas distribution channel and the second gas distribution channel;
determining a desired gas nozzle injection position and injection angle according to a type of the substrate;
selecting ones of the adapters according to the desired gas nozzle injection position and injection angle;

attaching the selected adapters to the gas ring; and
injecting gas toward the substrate through the selected adapters according to the
desired gas nozzle injection position and injection angle.